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FTD-TT- 62-1500

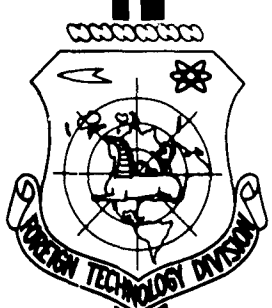
TRANSLATION

LOGICAL ELEMENT

By

N. P. Brusentsov

FOREIGN TECHNOLOGY DIVISION



AIR FORCE SYSTEMS COMMAND

WRIGHT-PATTERSON AIR FORCE BASE

OHIO

UNEDITED ROUGH DRAFT TRANSLATION

LOGICAL ELEMENT

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English Pages: 4

SOURCE: Russian Patent Nr. 145070 (698409/26), 22 February 1961, pp 1-3

S/19-62-0-4

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LOGICAL ELEMENT

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Submitted February 22, No. 698409/26 at the Committee on Inventions and Discoveries at the Soviet of Ministers USSR

Published in Bulletin of Inventions No. 4, 1962.

Known are logical elements for the realization of logical functions by algebraic combination of input ampere-turns, made on the basis of a high speed magnetic amplifier with pulsed current feeding on one core and one diode (ferrite-diode transformer type element).

The proposed logical element is distinguished by the fact, that to eliminate the shunting effect of the winding, to prevent return of information into the preceding stage and to stabilize the amplitude of the output current pulse and the output circuit of the element in sequence with the diode and secondary winding of the core is connected a nonlinear resistor of the stabilitron type, common for all elements of the machine (block) and connected to lines, feeding the elements current pulses, and shunted by greater capacitance.

The principal schematic of the described logical element is given in drawing.

In the arrangement the amplifier 1 executes the logical operation $A \cdot \bar{B}$ and amplifiers 2 and 3 appear to be buffer elements at its inputs. Into the output circuit of the amplifier 1 (of the logical element) in-series with diode 4 and secondary winding of its core is connected a nonlinear resistor 5(Z), on which on account of the power currents and on account of the currents , flowing in the communications circuit,

is produced a stable voltage E, shutting (closing) diodes 6 and 7 in the communication circuits. In order that the voltage magnitude E should depend little upon the information transmitted over the communication circuits, the resistor Z should have a voltampere characteristic of stabilitron type.

The employment of a nonlinear resistor is for the purpose of attaining the following goals.

During magnetic polarity reversal of current 1 with current i and in winding 8 originates an EMF acting in direction of conductivity of diode 6 and creating(at Z=0) a current tending toward magnetic polarity reversal of the core in state "1"- the effect of returning information into preceding state. This effect, in addition to return of information, is harmful also by the fact, that a considerable part of pulse current energy i and the power in place of it, in order to get to the output of amplifier 1, scatters over diode 6, ruggedizing its thermal condition and the output of amplifier 1 ceasing being a source of stable amplitude current.

To eliminate these harmful phenomena produced on the resistor Z by current i_1 and i_{II} the DC voltage E should be greater than the amplitude of EMF induced in winding 8 under the effect of current i_{II}.

In case when A = 1, and B = 0_1 under the effect of current i_I magnetic polarity reversal affect only the core and current i_a originates while current i_v = 0. Magnetic reversal of core 1 under the effect of current i_a produces the phenomenon of EMF closing in winding 9 acting in direction of diode 7 conductivity and creating (at Z = 0)a current counteracting the magnetic polarity reversal action of current i_a in winding 8. This leads to prolongation in magnetic polarity reversal of the core. To assure given magnetic polarity reversal time it is necessary to raise the current i_a of the input signal so that all the losses in the restriction circuits will be compensated, i.e.the shunting action of the latter.

This harmful shunting is eliminated, if resistor Z was selected so,that the

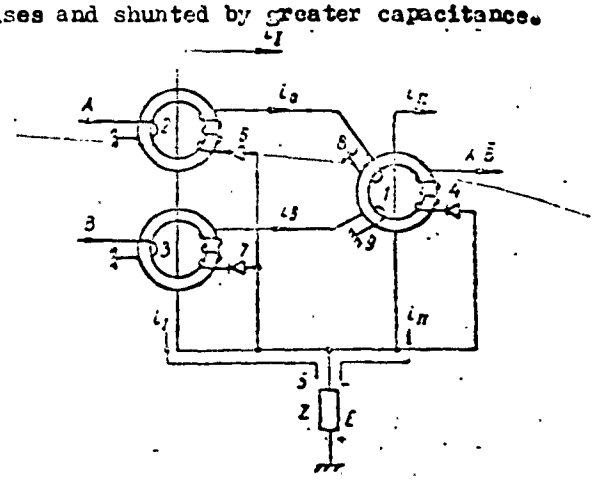
magnitude of voltage E on it exceeds the E.M.F amplitude originating in the restriction windings.

Furthermore, at sufficient magnitude of voltage E on resistor Z the influence of resistance changes of diode 4 on the duration of the output pulse is considerably weaker.

In this way, in the described logical element is eliminated the shunting effect of restriction windings, return of information into the preceding stage with a simultaneous increase in amplitude stability of output current pulses, which broadens the field of application of similar logical elements in mathematical scale.

Object of invention

Logical element to realize logical functions by algebraic combination of input ampere-turns, made on the basis of a high speed magnetic amplifier with current pulse feeding on one core and one diode, characterized by the fact, that, for the purpose of eliminating the shunting effect of restriction windings, return of information into the preceding stage and stabilization of amplitude of output current pulse, into the output circuit of the element in series with the diode and secondary winding of the core is connected a nonlinear stabilitron type resistor, common for all elements of the machine (block), connected to power lines, feeding elements with current pulses and shunted by greater capacitance.



Schematic drawing

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